WHAT IS CLAIMED IS:

1. A method for detecting an operation of a sensing device that operates by producing a physical displacement effect, the method comprising the steps of:

selecting an electrical component structure capable of producing an electromagnetic field in response to an applied radio frequency signal that extends from said electrical component structure;

placing the electrical component structure in proximity to a physical component of the sensing device that is displaced by operating the sensing device;

applying a radio frequency signal to the electrical component structure;

operating the sensing device to displace the physical component, such that the displaced physical component perturbs the electromagnetic field without physically contacting the electrical component structure;

monitoring an output signal affected by the electromagnetic field; and

detecting an operation of the sensing device according to a change in the output signal, said detected change indicating the displacement of the physical component.

2. The method of claim 1, wherein the change in the output signal is detected as a change in at least one of a frequency, phase and amplitude of the output signal.

3. The method of claim 1, wherein said detecting step further includes the step of:

comparing the output signal to a reference signal.

4. The method of claim 3, wherein said reference signal is affected by a second electromagnetic field produced by a second electrical component structure, wherein said second electromagnetic field is unperturbed by any physical component.

5. The method of claim 3, wherein said reference signal is affected by a second electromagnetic field produced by a second electrical component structure, wherein said second electromagnetic field is perturbed by the physical component, a second output signal is affected by the second electromagnetic field, and operation of the sensing device is detected according to a differential measurement of the change in the output signal and a change in the second output signal.

6. A sensing device that operates by producing a physical displacement effect, said sensing device comprising:

an electrical component structure that produces an electromagnetic field in response to an applied radio frequency signal, said electromagnetic field extending from said electrical component structure;

a physical component displaced by operating the sensing device; and

a monitoring circuit for monitoring an output signal affected by the electromagnetic field and detecting an operation of the sensing device according to a change in the output signal, said detected change indicating a displacement of the physical component;

wherein said physical component is positioned relative to the electronic component structure such that the physical component perturbs the electromagnetic field without physically contacting said electrical component structure.

7. The sensing device of claim 6, wherein the physical component is made of metal.

8. The sensing device of claim 6, wherein the physical component includes a dielectric material.

9. The sensing device of claim 6, wherein the physical component includes a semiconductor material.

10. The sensing device of claim 6, wherein the physical component comprises a material selected from the group consisting of metals, plastics, biological materials, frozen liquids, wood, ceramics, brick and concrete.

11. The sensing device of claim 6, wherein the sensing device is selected from the group consisting of load cells, pressure sensors, pressure switches, accelerometers, proximity sensors, proximity switches, weighing sensors, linear displacement sensors, angular displacement sensors, linear encoders, velocity meters and flow meters.

12. The sensing device of claim 6, wherein the electrical component structure has a planar structure.

13. The sensing device of claim 6, wherein the electrical component structure has a non-planar structure.

14. The sensing device of claim 6, wherein the electrical component structure is a transverse electromagnetic (TEM) structure.

15. The sensing device of claim 6, wherein the electrical component structure is a non-transverse electromagnetic (non-TEM) structure.

16. The sensing device of claim 12, wherein the planar structure is selected from the group consisting of distributed transmission structures, open-ended waveguides, dielectric waveguides, co-planar waveguides (CPWs), interdigital capacitors and microstrips.

17. The sensing device of claim 12, wherein the electrical component structure is a spiral resonator.

18. The sensing device of claim 6, wherein the physical component is linearly displaced along an axis that is parallel to a plane of the electrical component structure.

19. The sensing device of claim 6, wherein the physical component is linearly displaced along an axis that is non-parallel to a plane of the electrical component structure.

20. The sensing device of claim 6, wherein the change in the output signal has a linear relationship with respect to a distance displaced by the displacement of the physical component.

21. The sensing device of claim 6, further comprising:

at least a second electrical component structure capable of producing a second electromagnetic field in response to the applied radio frequency signal.

22. The sensing device of claim 21, wherein said monitoring circuit detects the change in the output signal by comparing the output signal to a reference signal that is affected by the second electromagnetic field, wherein the second electromagnetic field is unperturbed by any physical component.

23. The sensing device of claim 21, wherein said second electromagnetic field is perturbed by the physical component to produce a second output signal, and wherein said monitoring circuit detects the change in the output signal by detecting a differential measurement of change in the output signal and the second output signal.

24. A transducer for sensing a displacement of a physical component of a sensing device, said transducer comprising:

a substrate;

an electrical component structure that produces an electromagnetic field in response to an applied radio frequency signal, said electromagnetic field extending from said electrical component structure; and

a monitoring circuit for monitoring an output signal affected by the electromagnetic field and detecting a perturbation in the electromagnetic field resulting from a displacement of a physical component through a portion of the extended electromagnetic field.

25. The transducer of claim 24, further comprising:

a second electrical component structure that produces a second electromagnetic field in response to the applied radio frequency signal, said second electromagnetic field extending from said second electrical component structure;

wherein said monitoring circuit detects the displacement of the physical component by comparing the output signal to a reference signal that is affected by the second electromagnetic field, wherein said second electromagnetic field is unperturbed by any physical component.

26. The transducer of claim 25, wherein each of said electrical component structure and said second electrical component structure comprises a spiral resonator.

27. The transducer of claim 26, wherein said monitoring circuit further comprises

a first inverter for inverting transforming an output signal of said electrical component structure to a first pulse stream;

a second inverter for inverting transforming an output signal of said second electrical component structure to a second pulse stream;

an exclusive-or (XOR) circuit inputting said first and second pulse streams and outputting a pulse width modulation (PCM) stream, said PCM stream being linearly

proportional to a phase difference between said output signal of said electrical component structure and said output signal of said second electrical component structure; and

a low pass filter for converting said PCM stream to a direct current (DC) voltage.

28. A load cell, comprising:

a body having a beam, said beam having a displacement end that is displaced upon application of a load in proximity to said displacement end;

a transducer, said transducer including:

a substrate,

an electrical component structure mounted to the substrate that produces an electromagnetic field in response to an applied radio frequency signal, said electromagnetic field extending from said electrical component structure, and

a monitoring circuit mounted to the substrate for monitoring an output signal affected by the electromagnetic field and detecting an operation of the sensing device according to a change in the output signal, said detected change indicating a displacement of the physical component; and

a mounting block for mounting the substrate to the body such that the displacement end is in proximity to said electrical component structure such that a displacement of the physical component perturbs the electromagnetic field without physically contacting said electrical component structure.

29. The load cell of claim 28, wherein said mounting block is removably mounted to the body.

30. The load cell of claim 28, wherein said electrical component structure comprises:

a spiral resonator mounted on a first side of the substrate;

a ground plane mounted on an opposing side of the substrate; and

a via that pierces the substrate to electrically interconnect the spiral resonator to the ground plane.

31. The load cell of claim 28, wherein said transducer further comprises:

a second electrical component structure capable of producing a second electromagnetic field in response to the applied radio frequency signal;

wherein said monitoring circuit detects the change in the output signal by comparing the output signal to a reference signal that is affected by the second electromagnetic field, wherein the second electromagnetic field is unperturbed by any physical component.

32. The load cell of claim 28, further comprising:

a second electrical component structure mounted to a second substrate that produces a second electromagnetic field in response to the applied radio frequency signal, said second electromagnetic field extending from said second electrical component structure, said substrate and said second substrate being attached to opposing sides of the mounting block;

a second beam of the body having a second displacement end, said second displacement end being positioned in proximity to said second electrical component

structure and linked to said displacement end that is positioned in proximity to said electrical component structure;

wherein said monitoring circuit detects the change in the output signal by monitoring a second output signal affected by the second electromagnetic field and detecting a differential change between each of the output signal and the second output signal.

33. The transducer of claim 25, wherein said monitoring circuit further comprises:

a first amplitude detector for detecting a first amplitude of the output signal of said first electrical component structure;

a second amplitude detector for detecting a second amplitude of the output signal of said second electrical component structure; and

a differential amplifier for detecting a difference relationship between said first amplitude and said second amplitude.

34. The sensing device of claim 6, further comprising:

a substrate, wherein the electrical component structure and monitoring circuit are mounted on the substrate; and

a mounting block for mounting the substrate to a body of the sensing device.

35. The sensing device of claim 34, wherein said mounting block is removably mounted to the body.

36. The sensing device of claim 6, wherein the electrical component structure includes a first antenna, and the monitoring circuit are remotely located and coupled to a second antenna and a power circuit, such that a wireless, passive link is thereby formed between the power circuit and the electrical component structure and the monitoring circuit and the electrical component structure.

37. The transducer of claim 25, wherein said monitoring circuit comprises a phase locked loop for detecting a phase change in the output signal.

38. A torque transducer comprising:

a cylindrical body having at a beam, said body further including at least one vertical plate radially extending at one longitudinal end of said cylindrical body;

a transducer, said transducer including:

a substrate,

an electrical component structure mounted to the substrate that produces an electromagnetic field in response to an applied radio frequency signal, said electromagnetic field extending from said electrical component structure, and

a monitoring circuit mounted to the substrate for monitoring an output signal affected by the electromagnetic field; and

a mounting block mounted to the cylindrical body at a second longitudinal end in opposition to said first longitudinal end, and fixedly holding the substrate so that said electrical component structure is in proximity to the at least one vertical plate;

wherein a torsional force applied at the first longitudinal end of the cylindrical body causes a displacement of the at least one vertical plate in relation to the electrical

component structure that perturbs the electromagnetic field without physically contacting said electrical component structure, and said monitoring circuit detects a change in the output signal indicative of the perturbation to the electromagnetic field and the displacement of the at least one vertical plate.